INCH-POUND

MIL-E-1/83G
26 March 2003
SUPERSEDING
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17 February 1981

MILITARY SPECIFICATION SHEET

ELECTRON TUBE, THRYTRON
TYPE 5727

This specification sheet is inactive for new design after 7 March 1997.

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the electron tube described herein shall consist of this document and MIL-PRF-1.

DESCRIPTION: Tetrode, xenon gas.

Outline	---	5-2 (EIA).
Cathode	---	Coated unipotential
Mounting position	---	Any
Weight	---	0.3 ounce (8.5 grams) nominal.

Base connections:

Pin no.	---	1	2	3	4	5	6	7
Element	---	g1	k	h	h	g2	a	g2

RATINGS:

Parameter:	Ef	epp	epy	epx	Conduction		Nonconduction		ehk	Rg1	Rg2	ik
					Ec2	Ec1	ec2	ec1				
Unit:	V	v	v	v	V	V	v	v	v	Meg	Ohms	a
Relay, G controlled rectifier: Maximum:	6.9	---	650	1,300	---	---	---	---	25	10	---	0.5
Minimum:	5.7	---	---	---	-10	-10	-100	-100	-100	---	---	---
Pulse modulator: Maximum:	6.9	500 1/	500	100	---	---	---	---	0	0.5	25K	10
Minimum:	6.0	---	---	---	-10	-10	-50	-100	0	---	2K	---
Test conditions:	6.3	---	---	---	0	---	---	---	---	---	---	---

RATINGS:

Parameter:	ik	Ic2	ic1	Ig2	Ig1	tp	dik/dt	prr	Du	TA	tk
Unit:	mA 2/	ma	ma	mA 2/	mA 2/	µs	a/µs	---	---	°C	sec
Relay, G controlled rectifier:											
Maximum:	100	---	---	10	10	---	---	---	---	90	---
Minimum:	---	---	---	---	---	---	---	---	---	-75	20
Pulse modulator: Maximum:	10	20	20	---	---	5	100	500	0.001	90	---
Minimum:	---	---	---	---	---	---	---	---	---	-75	20
Test conditions:	---	---	---	---	---	---	---	---	---	---	20 (min)

See footnotes at end of table I.

GENERAL:

First Article test is required and shall consist of all tests in table I with a sample size of 2 for a lot size less than or equal to 150 units and a sample size of 4 units for a lot size greater than or equal to 151 units. All samples will pass conformance inspection part 1 of table I before continuing. Half of the samples shall then be subjected to conformance inspection part 2, and the remaining samples shall be subjected to part 3, with no test failures permitted during any testing.

After First Article approval, acceptance testing shall consist of conformance Inspection part 1 of table I with sample size in accordance with table III, category XVI of MIL-PRF-1.

Reliable tube.

Holding period in accordance with MIL-STD-1311: t = 24 hours.

TABLE I. Testing and inspection.

MIL-STD-1311 Test method	Requirement or test	Conditions	Symbol	Limits		Units
				Min	Max	
	Conformance inspection, part 1					
1201	Short and discontinuity detection		---	---	---	---
3241	Heater current		If	550	650	mA
1336	Heater-cathode leakage	Ehk = +25 V dc Ehk = -100 V dc	Ihk Ihk	--- ---	15 15	µA dc µA dc
3201	Critical grid voltage for conduction (1)	Epp = 460 V ac; Rg1 = 0.1 Meg; Rp = 3,000 ohms 3/ 5/ 6/	Ecc1	-2.9	-4.5	V dc
3201	Critical grid voltage for conduction (2)	Epp = 460 V ac; Rg1 = 10 Meg; Rp = 3,000 ohms 5/ 6/	Ecc1	---	-5.2	V dc
3201	Critical anode voltage for conduction (1)	Ecc1 = 0; Rg1 = 0.1 Meg; Rp = 1,000 ohms 5/	Ebb	---	38	V dc
3201	Critical anode voltage for conduction (2)	Ef = 0; Ecc1 = -100 V dc; Rg1 = 0; Rp = 10,000 ohms 5/ 7/	Ebb	650	---	V dc
1231	Pulse emission	e = 180 ± 9 v; t = 3 sec (max); Rp; = 10 ohms; Ra = 15 ohms; Zm = 7.5 ohms; prr = 100 ±5; calibrating resistor = 5 ohms	etd	---	76	v

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

MIL-STD-1311 Test method	Requirement or test	Conditions	Symbol	Limits		Units
				Min	Max	
	Conformance inspection, part 1 - Continued					
---	Operation	Ebb = 500 V dc (approx); egy = 100 v; epy = 1,000 v; Ecc1 = -50 V dc Ecc2 = 0; prr = 500; Zo = 25 ±5 percent; Rℓ = 20 ±5 percent 8/	ib	16	---	a
	Conformance inspection, part 2					
1211	Insulation of electrodes	Ef = 6.3 V; Eg2-p = ±380 V dc 9/	R	760	---	Meg
1121	Base strain		---	---	---	---
2126	Envelope strain	3/	---	---	---	---
1031	High-frequency vibration	No voltages applied; fixed amplitude = 0.0625 ± 0.0025	---	---	---	---
1041	Shock	720 G	---	---	---	---
---	Shock-test end points:					
1336	Heater-cathode leakage	Ehk = +25 V dc Ehk = -100 V dc	Ihk Ihk	--- ---	40 40	µA dc µA dc
3201	Critical anode voltage for conduction (1)		Ebb	---	50	V dc
1231	Pulse emission		Etd	---	76	v
3201	Critical anode voltage for conduction (1)		Ecc1	-2.9	-4.5	V dc
3201	Critical grid voltage for conduction (3)	Ef = 7.0 V; Epp = 460 V ac; Rg1 = 10 Meg; Rp = 3,000 ohms 5/ 6/ 10/	Ecc1	---	-6.4	V dc
3201	Critical grid voltage for conduction (3)	Ef = 5.7 V; Ecc1 = 0; Rg1 = 0.1 Meg; Rp = 1,000 ohms 5/ 11/	Ebb	---	50	V dc
1261	Electrode voltage (grid no. 2)	Epp = 150 V ac; Egg1 = 16 V ac; Rp = 1,000 ohms; Rg1 = 2,500 ohms 12/ 13/	Egg2	1.9	3.3	V ac

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

MIL-STD-1311 Test method	Requirement or test	Conditions	Symbol	Limits		Units
				Min	Max	
	Conformance inspection, part 3					
1506	Heater-cycling life	Ef = 7.5 V; Ehk = -100 V dc; Ec1 = Ec2 = Eb = 0 14/	---	---	---	---
---	Heater-cycling life-test end poiint:					
1336	Heater-cathode leakage	Ehk = +25 V dc Ehk = -100 V dc	Ihk Ihk	--- ---	20 20	µA dc µA dc
1516	Stability life	Epp = 460 V ac; Rp/Ib = 80 mA dc (min); Rg1 = 50,000 ohms; Rp/ib = 500 ma (min); Ta = room; tk = 20 +0, -1 5/ 15/	---	---	---	---
---	Stability life-test end points (2 and 20 hours)					
3201	Critical grid voltage for conduction (1)		Ecc1	-2.8	-4.6	V dc
---	Change in grid voltage (1) of individual tubes		∆Ecc1	---	15	%
1501	Intermittent life	Epp = 460 V ac; Rp/Ib = 80 mA dc (min); Rg1 = 50,000 ohms; Rp/ib = 500 mA (min); tk = 20 +0, -1 Ehk = -100 V dc; TE = 150°C (min) 5/ 15/ 16/	---	---	---	---
---	Intermittent life-test end points (500 hours)					
3241	Heater current		If	550	660	mA
3201	Critical grid voltage for conduction (1)		Ecc1	-2.0	-4.8	V dc
3201	Critical anode voltage for conduction (1)		Ebb	---	50	V dc
1231	Pulse emission		etd	---	100	v
1336	Heater-cathode leakage	Ehk = +25 V dc Ehk = -100 V dc	Ihk Ihk	--- ---	20 20	µA dc µA dc
1211	Insulation of electrodes	g2 = p	R	380	---	Meg

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

MIL-STD-1311 Test method	Requirement or test	Conditions	Symbol	Limits		Units
				Min	Max	
	Conformance inspection, part 3 - Continued					
---	Intermittent life-test end points: (1,000 hours)					
3241	Heater current		If	550	666	MA
3201	Critical anode voltage for conduction (1)		Ecc1	-1.6	-4.8	V dc
3201	Critical grid voltage for conduction (1)		Ebb	---	120	V dc
1336	Heater-cathode leakage	Ehk = +25 V dc Ehk = -100 V dc	Ihk Ihk	--- ---	50 50	µA dc µA dc
1211	Insulation of electrodes	g2 = p	R	300	---	Meg

---	Life test (continuous)	Group A;
		epy = 500 v (approx);
		egy = 100 v (max);
		Ecc1 = -50 V dc;
		Ecc2 = 0;
		Zo = 12.5 ± 5 percent;
		Rℓ = 7.5 ± 5 percent
		18/
			---	---	---	---

---	Life-test end points; (200 hours) (continuous)					
1231	Pulse emission		etd	---	100	v
---	Operation under continuous life-test conditions	4/	ib	16	---	a
1031	Vibration-fatigue		---	---	---	---
---	Vibration-fatigue test end points:					
1336	Heater-cathode leakage	Ehk = +25 V dc Ehk = -100 V dc	Ihk Ihk	--- ---	40 40	µA dc µA dc
3201	Critical anode voltage for conduction (1)		Ebb	---	50	V dc
1231	Pulse emission		etd	---	76	v
3201	Critical anode voltage for conduction (1)		Ecc1	-2.9	-4.5	V dc

1/ After completion of a pulse, a 20 µs delay is required before a positive voltage of more than 10 v is applied to the tube.

2/ Averaged over any interval of 30 seconds maximum.

3/ This test shall be performed at the conclusion of the holding period.

4/ Thirty seconds shall be the maximum time under test conditions before reading ib. There shall be no evidence of amplitude jitter.

5/ Connect pins No. 5 and No. 7 to pin No. 2.

TABLE I. Testing and inspection - Continued.

6/ Use miniature steatite socket with grounded shield base. Shield the anode power supply. Use short shielded anode and grid leads. Anode and grid resistors shall be noninductive. Connect the grid resistor directly at socket.

7/ No voltages shall be applied to the tube for 20 minutes minimum preceding this test.

8/ Thirty seconds maximum in the operation test socket is permitted before reading. There shall be no evidence of amplitude jitter. The tube shall be tested in the circuit shown on figure 1. The circuit constants shall be so chose that: at epy = 1,000 v under resonant charging conditions, dik/dt = 100 a/μs minimum, tp = 2.0 μs ± 10 percent, prr = 500. The grid pulse characteristic at egy = 100 v shall be: tp = 2.0 μs maximum, tr = 0.5 μs minimum, driver impedance = 500 ohms minimum.

9/ Read electrode insulation between g2 and anode with all other elements floating.

10/ Preheat for 15 minutes under the following conditions: Ef = 7.0 V; Epp = 220 V ac; Ecc1 = Ecc2 = 0; Rg1 = 10 Meg; Ib = 100 mA dc. Two seconds shall be the maximum time between preheat and test.

11/ Preheat using Ef = 5.7 V.

12/ Egg1 supply shall be in phase with Epp supply and Egg2 supply 180 degrees out of phase with Epp supply.

13/ Vary Egg2 supply and read Egg2 at which conduction occurs.

14/ The no-load to steady-state full-load regulation of the heater-voltage supply shall not be more than 3.0 percent. This test shall be made on a lot-by-lot basis.

15/ Phase of grid voltage adjusted to provide start of conduction at peak applied anode voltage.

16/ Envelope temperature (TE) is defined as the highest temperature indicated when using a thermocouple of No. 30 B&S or smaller diameter elements welded to a ring of .025-inch diameter phosphor bronze in contact with the envelope. The envelope temperature requirement will be satisfied if a tube, which draws 80 mA dc (±5 percent) anode current and 500 ma (±5 percent) peak anode current under the life-test conditions, is determined to operate at, or above, the minimum specified temperature at any position on the life-test rack.

17/ Adjust epy for ib = 20a initially, and maintain this epy value throughout the life test. The tube shall be tested in the circuit shown on figure 1. The circuit constants shall be so chosen that: at epy = 500 v under resonant charging conditions, dik/dt = 100 a/μs minimum, tp = 2.0 μs ± 10 percent, prr = 1,000. The grid pulse characteristic at egy = 100 v shall be: tp = 2.0 μs maximum, tr = 0.5 μs minimum, driver impedance = 500 ohms minimum.

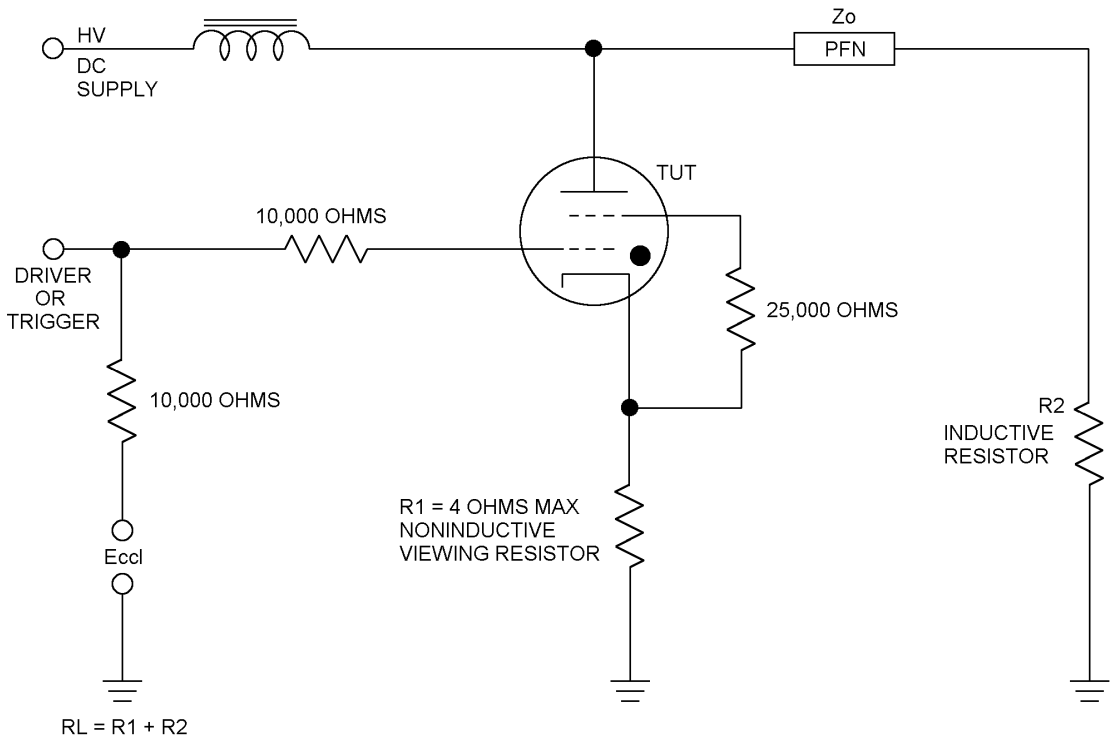

FIGURE 1. Test circuit.

Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA - CC

Review activities:
Army - AR, CR4
Navy - AS, CG, MC, OS
Air Force - 99

Preparing activity:
DLA - CC

(Project 5960-3662)